

PCTWORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁵ : C08F 10/00, C07F 5/02 C08F 4/645, 10/14	A3	(11) International Publication Number: WO 93/21238 (43) International Publication Date: 28 October 1993 (28.10.93)
(21) International Application Number: PCT/US93/02099 (22) International Filing Date: 8 March 1993 (08.03.93) (30) Priority data: 07/868,041 14 April 1992 (14.04.92) US (71) Applicant: MINNESOTA MINING AND MANUFACTURING COMPANY [US/US]; 3M Center, Post Office Box 33427, Saint Paul, MN 55133-3427 (US). (72) Inventors: SIEDLE, Allen, R. ; LAMANNA, William, M. ; Post Office Box 33427, Saint Paul, MN 55133-3427 (US). (74) Agents: PETERS, Carolyn, V. et al.; Office of Intellectual Property Counsel, Minnesota Mining and Manufacturing Company, P.O. Box 33427, Saint Paul, MN 55133-3427 (US).		(81) Designated States: AT, AU, BB, BG, BR, CA, CH, CZ, DE, DK, ES, FI, GB, HU, JP, KP, KR, LK, LU, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SK, UA, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, SN, TD, TG). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> (88) Date of publication of the international search report: 20 January 1994 (20.01.94)
(54) Title: TRIS(PENTAFLUOROPHENYL)BORANE COMPLEXES AND CATALYSTS DERIVED THEREFROM (57) Abstract Tris(pentafluorophenyl)borane complexes having the general formula $(C_6F_5)_3B-(YXH)_q$ wherein X is oxygen, or sulfur; q is 1 to 3; Y is a hydrogen atom, R^1 , $(R^2)_3Si$, or $(R^3)_2C=N$; R^1 is a hydrocarbyl group containing 1 to 500 carbon atoms, and may contain a divalent oxygen and further may be a fluorine-containing hydrocarbyl group; R^2 is independently a linear or branched alkyl group containing 1 to 25 carbon atoms, or a phenyl group, further R^2 may contain a SiO- group; and R^3 is independently a hydrocarbyl group containing 1 to 25 carbon atoms, R^3 may be a hydrogen atom provided both R^3 groups selected are not hydrogen atoms; and to complexes containing the borane complexes with an organometallic compound, either as a neutral compound or as an acidic salt that are useful as catalysts for polymerization and copolymerization of olefins and to polymeric products prepared using these catalysts.		

BEST AVAILABLE COPY

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	FR	France	MR	Mauritania
AU	Australia	GA	Gabon	MW	Malawi
BB	Barbados	GB	United Kingdom	NE	Niger
BE	Belgium	GN	Guinea	NL	Netherlands
BF	Burkina Faso	GR	Greece	NO	Norway
BG	Bulgaria	HU	Hungary	NZ	New Zealand
BJ	Benin	IE	Ireland	PL	Poland
BR	Brazil	IT	Italy	PT	Portugal
BY	Belarus	JP	Japan	RO	Romania
CA	Canada	KP	Democratic People's Republic of Korea	RU	Russian Federation
CF	Central African Republic	KR	Republic of Korea	SD	Sudan
CG	Congo	KZ	Kazakhstan	SE	Sweden
CH	Switzerland	LI	Licchtenstein	SI	Slovenia
CI	Côte d'Ivoire	LK	Sri Lanka	SK	Slovak Republic
CM	Cameroon	LU	Luxembourg	SN	Senegal
CN	China	LV	Latvia	TD	Chad
CS	Czechoslovakia	MC	Monaco	TC	Togo
CZ	Czech Republic	MG	Madagascar	UA	Ukraine
DE	Germany	ML	Mali	US	United States of America
DK	Denmark	MN	Mongolia	UZ	Uzbekistan
ES	Spain			VN	Viet Nam
FI	Finland				

BEST AVAILABLE COPY

INTERNATIONAL SEARCH REPORT

Int. Appl. No.

PCT/US 93/02099

A. CLASSIFICATION OF SUBJECT MATTER

IPC 5 C08F10/00 C07F5/02 C08F4/645 C08F10/14

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 5 C08F C07F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP,A,0 426 637 (FINA TECHNOLOGY, INC) 8 May 1991 see page 4, line 27 - page 5, line 25 ---	11
A	DE,A,12 94 378 (KULZER & CO GMBH) 8 May 1969 see the whole document ---	1-3
A	EP,A,0 443 739 (AIR PRODUCTS AND CHEMICALS) 28 August 1991 see the whole document ---	1
A	EP,A,0 427 697 (FINA TECHNOLOGY, INC) 15 May 1991 see claims 1,17 see example 2 --- -/--	11-22

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

3 December 1993

Date of mailing of the international search report

17. 12. 93

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+ 31-70) 340-2040, Tx. 31 631 epo nl,
Fax: (+ 31-70) 340-3016

Authorized officer

Fischer, B

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 93/02099

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
E	WO,A,93 12151 (EXXON CHEMICALS PATENTS INC) 24 June 1993 see examples 3-6,8-12	29

X	WO,A,91 04257 (EXXON CHEMICAL PATENTS INC) 4 April 1991 see examples 35-37 see examples 43,44,57	29
X	see example 36 -----	31

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 93/02099

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

See PCT/ISA/206 mailed on 27.08.1993

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 93/02099

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A-0426637	08-05-91	CA-A- 2027123 CN-A- 1051311 JP-A- 3207703	01-05-91 15-05-91 11-09-91
DE-A-1294378		BE-A- 715658 CH-A- 494773 FR-A- 1567499 GB-A- 1152421 NL-A- 6807124 US-A- 3558718	16-10-68 15-08-70 16-05-69 21-05-69 25-11-68 26-01-71
EP-A-0443739	28-08-91	GB-A- 2240975	21-08-91
EP-A-0427697	15-05-91	CA-A- 2027145 CN-A- 1051684 JP-A- 3179005	11-04-91 29-05-91 05-08-91
WO-A-9312151	24-06-93	NONE	
WO-A-9104257	04-04-91	US-A- 5055438 AU-A- 6248390 AU-A- 6443990 CA-A- 2024899 CA-A- 2065745 EP-A- 0420436 EP-A- 0491842 JP-A- 3188092 US-A- 5026798 US-A- 5057475 US-A- 5168111 US-A- 5227440 US-A- 5264405 US-A- 5096867	08-10-91 21-03-91 18-04-91 14-03-91 14-03-91 03-04-91 01-07-92 16-08-91 25-06-91 15-10-91 01-12-92 13-07-93 23-11-93 17-03-92